

VI. Claims

1. A method for producing homozygous stem (HS) cells having a target genotype from non-fertilized post-meiosis I diploid germ cells, comprising:
  - (a) determining a target genotype;
  - (b) mitotically activating non-fertilized post-meiosis I diploid germ cells to develop multiple blastocyst-like masses, each of which contains an inner cell mass (ICM) that is homozygous for the target genotype;
  - (c) isolating HS cells from the ICM;
  - (d) culturing the isolated HS cells to obtain HS cell lines;
  - (e) determining the genotype of each HS cell line; and
  - (f) selecting the cells that are homozygous for the target genotype.
2. The method of claim 1, wherein the target genotype does not contain the genetic mutation associated with a particular disease or disorder.
3. The method of claim 1, wherein the target genotype contains the genetic mutation associated with a particular disease or disorder.
4. The method of claim 2 or 3, wherein the non-fertilized post meiosis I diploid germ cells are obtained from a heterozygous donor carrying a mutant allele associated with a particular disease or disorder and the corresponding wild-type allele.
5. The method of claim 1, wherein the non-fertilized post-meiosis I diploid germ cells are donated by a donor and the resultant HS cells are intended for a recipient in need thereof.
6. The method of claim 5, wherein the donor and recipient are the same individual, wherein the donor and the recipient are related, or wherein the donor and the recipient are unrelated.

7. A method for producing homozygous stem (HS) cells having a target immunotype from non-fertilized post-meiosis I diploid germ cells, comprising:
  - (a) determining a target immunotype
  - (b) mitotically activating non-fertilized post-meiosis I diploid germ cells to develop blastocysts-like masses, each of which contains an inner cell mass (ICM) that is homozygous for the target immunotype;
  - (c) isolating HS cells from the ICM;
  - (d) culturing the isolated HS cells to obtain HS cell lines;
  - (e) determining the immunotype of each HS cell line; and
  - (f) selecting the cells that are homozygous for the target immunotype.
8. The method of claim 7, wherein the target immunotype does not contain the genetic mutation associated with a particular disease or disorder.
9. The method of claim 7, wherein the target immunotype contains the genetic mutation associated with a particular disease or disorder.
10. The method of claim 8 or 9, wherein the non-fertilized post-meiosis I diploid germ cells are obtained from a heterozygous donor carrying a mutant allele associated with a particular disease or disorder and the corresponding wild-type allele.
11. The method of claim 7, wherein the non-fertilized post-meiosis I diploid germ cells are donated by a donor and the resultant HS cells are intended for a recipient in need thereof.
12. The method of claim 11, wherein the donor and the recipient are the same individual, wherein the donor and the recipient are related, or wherein the donor and the recipient are unrelated.

13. A method for producing homozygous stem (HS) cells having a target immunotype and genotype from non-fertilized post-meiosis I diploid germ cells, comprising:
- (a) determining a target immunotype and genotype;
  - (b) mitotically activating non-fertilized post-meiosis I diploid germ cells to develop blastocysts-like masses, each of which contains an inner cell mass (ICM) that is homozygous for the target immunotype and genotype;
  - (c) isolating HS cells from the ICM;
  - (d) culturing the isolated HS cells to obtain HS cell lines;
  - (e) determining the genotype of each HS cell line; and
  - (f) selecting the cells that are homozygous for the target immunotype and genotype.
14. The method of claim 13, wherein the target genotype does not contain the genetic mutation associated with a particular disease or disorder.
15. The method of claim 13, wherein the target genotype contains the genetic mutation associated with a particular disease or disorder.
16. The method of claim 14 or 15, wherein the non-fertilized post-meiosis I diploid germ cells are obtained from a heterozygous donor carrying a mutant allele associated with a particular disease or disorder and the corresponding wild-type allele.
17. The method of claim 13, wherein the non-fertilized post-meiosis I diploid germ cells are donated by a donor and the resultant HS cells are intended for a recipient in need thereof.
18. The method of claim 17, wherein the donor and the recipient are the same individual, wherein the donor and the recipient are related, or wherein the donor and the recipient are unrelated.

19. The method of claim 1 or 13, wherein the genotype of each HS cell line is determined using gel-based detection methods, using non-gel-based detection methods or with genetic markers.
20. The method of claim 7 or 13, wherein the target immunotype is determined using serological or molecular methods.
21. The method of claim 20, wherein the target immunotype is determined by HLA tissue typing.
22. The method of claim 1, 7, or 13, wherein (d) further comprises differentiating isolated HS cells to give rise to progenitor cells and/or other differentiated cells and tissue types.
23. The method of claim 22, wherein differentiation is directed by factors *in vitro*.
24. The method of claim 22, wherein differentiation is directed by factors *in vivo*.
25. A cell depository comprising multiple populations of HLA-typed HS cell lines, wherein each HS cell line is derived from a different donor and is homozygous for a unique HLA haplotype.
26. The cell depository of claim 25, wherein the HS cell lines are obtained from donors of different ethnicities.
27. The cell depository of claim 25 or 26, wherein the contents of the depository are catalogued.
28. A method for producing an HS cell depository of genotyped homozygous stem (HS) cells from multiple donors comprising:
  - (a) selecting donors;

- (b) determining the genotype of each donor;
- (c) mitotically activating non-fertilized post-meiosis I diploid germ cells obtained from each donor to develop multiple blastocyst-like masses, each of which contains an inner cell mass (ICM) that is homozygous for a particular genotype;
- (d) isolating HS cells from the ICM obtained from each donor;
- (e) culturing the isolated HS cells to obtain HS cell lines;
- (f) determining the genotype of each HS cell line; and
- (g) cataloging the genotype of each HS cell line obtained in (e).

29. A method for producing a HS cell depository of immunotyped homozygous stem (HS) cells from multiple donors comprising:

- (a) selecting donors;
- (b) determining the immunotype of each donor;
- (c) mitotically activating non-fertilized post-meiosis I diploid germ cells obtained from each donor to develop multiple blastocyst-like masses, each of which contains an inner cell mass (ICM) that is homozygous for a particular immunotype;
- (d) isolating HS cells from the ICM obtained from each donor;
- (e) culturing the isolated HS cells to obtain HS cell lines;
- (f) determining the immunotype of each HS cell line; and
- (g) cataloging the immunotype of each HS cell line obtained in (e).

30. A method for producing a HS cell depository of genotyped and immunotyped homozygous stem (HS) cells from multiple donors comprising:

- (a) selecting donors;
- (b) determining the genotype and immunotype of each donor;
- (c) mitotically activating non-fertilized post-meiosis I diploid germ cells obtained from each donor to develop multiple blastocyst-like masses, each of which contains an inner cell mass (ICM) that is homozygous for a particular genotype and immunotype;

- (d) isolating HS cells from the ICM obtained from each donor;
- (e) culturing the HS cells to obtain HS cell lines;
- (f) determining the genotype and immunotype of each HS cell line; and
- (g) cataloging the genotype and immunotype of each HS cell line obtained in (e).

31. The method of claim 28, 29, or 30, wherein the donors are mammalian.

32. The method of claim 31, wherein the donors are human.

33. The method of claim 31, wherein the donors are non-human.

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